

PRINTING A TRUE-INK REFERENCE, AND REFINING GRAY ACCURACY,
FOR OPTIMUM COLOR CALIBRATION IN INCREMENTAL PRINTING

ABSTRACT OF THE DISCLOSURE

Ramps are printed with ink of a particular color, and also nominally in that color but by inks of other colors. A measured actual-ink ramp is a standard to fix the other-colors ramp, and correct other printing in those colors. In one aspect a particular color is gray, actual ink black (K), and other-color inks magenta (M), yellow (Y) and cyan (C). In another aspect, actual ink is red (R), green (G) or blue (B); other colors M, Y and C in respective pairs. For gray/black, the K ramp is a zero-chroma standard to lower composite-black (cK) chroma below $\sim 2.5 \Delta E$. A sampling aspect prints for each gray tone plural cK-ink combinations preferably bracketing nominal gray values; and searches these combinations to get one nearest the particular gray — or most closely bracketing it, for interpolation — for best match. Bracketing is best optimized, by a color-space pattern centered on nominal. A modeling aspect inserts measured-ramp values into printer color-model equations, and solves (best by iteration) for best match. Equations are best of form $H = D \cdot E \cdot \dots \cdot F$; H a hybrid of two or more colors D, E . . . ; F a correction factor. In some expressions $H = cK$, $D = S_1$ and $E = S_2$ (S_1 and S_2 secondaries); in others $H = S$, $D = P_1$ and $E = P_2$ (P_1 and P_2 primaries). Another aspect models in a space transformed by shrinking primary axes near neutral; after calibration in shrunk space, an inverse transform reexpands results.

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